PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

PCT

To:

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NOTIFICATION OF TRANSMITTAL OF INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Rule 71.1)

	Date of mailing *(day/month/year)* 15-12-2004
Applicant's or agent's file reference 51154 WO	IMPORTANT NOTIFICATION

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/IB2002/004162	10-10-2002	

Applicant
Nokia Corporation
et al

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary report on patentability and its annexes, if any, established on the international application.

2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.

3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in som Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary report on patentability. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the *PCT Applicant's Guide.*

The applicant's attention is drawn to Article 33(5), which provides that the criteria of novelty, intentive step and industrial applicability described in Article 33(2) to (4) merely serve the purposes of international preliminary examination and that "any Contracting State may apply additional or different criteria for the purposes of deciding whether, in that State, the claimed invention is patentable or not" (see Also Article 27(5)). Such additional criteria may relate, for example, to exemptions from patentability, requirements for enabling disclosure, clarity and support for the claims.

Name and mailing address of the IPEA/		Authorized officer
Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. 08-667 72 88	Telex 17978 PATOREG-S	Inger Willén Telephone No. 08-782 25 00

Form PCT/IPEA/416 (January 2004)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 51154 WO	FOR FURTHER ACTION See Form PCT/IPEA/416	
International application No. PCT/IB2002/004162	International filing date *(day/month/year)* 10.10.2002	Priority date *(day/month/year)* --
International Patent Classification (IPC) or national classification and IPC H04R 1/28 // G10K 11/02		
Applicant Nokia Corporation et al		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☒ *(sent to the applicant and to the International Bureau)* a total of 3 sheets, as follows:
      ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s))
      _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).
4. This report contains indications relating to the following items:
   - ☒ Box No. I Basis of the report
   - ☐ Box No. II Priority
   - ☒ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - ☐ Box No. IV Lack of unity of invention
   - ☐ Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - ☐ Box No. VI Certain documents cited
   - ☐ Box No. VII Certain defects in the international application
   - ☒ Box No. VIII Certain observations on the international application

Date of submission of the demand	Date of completion of this report
09.03.2004	07.12.2004
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. +46 8 667 72 88	Authorized officer Leif Vingård / JA A Telephone No. +46 8 782 25 00

Form PCT/IPEA/409 (cover sheet) (January 2004)

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/IB2002/004162

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This report is based on a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of:

☐ international search (under Rules 12.3 and 23.1(b))
☐ publication of the international application (under Rule 12.4)
☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

☐ the international application as originally filed/furnished

☒ the description:

pages 1-19 as originally filed/furnished
pages* _____ received by this Authority on _____
pages* _____ received by this Authority on _____

☒ the claims:

pages _____ as originally filed/furnished
pages* 1-3 as amended (together with any statement) under Article 19
pages* _____ received by this Authority on _____
pages* _____ received by this Authority on _____

☒ the drawings:

pages 1-5 as originally filed/furnished
pages* _____ received by this Authority on _____
pages* _____ received by this Authority on _____

☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages _____
☐ the claims, Nos. _____
☐ the drawings, sheets/figs _____
☐ the sequence listing *(specify)*: _____
☐ any table(s) related to the sequence listing *(specify)*: _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

☐ the description, pages _____
☐ the claims, Nos. _____
☐ the drawings, sheets/figs _____
☐ the sequence listing *(specify)*: _____
☐ any table(s) related to the sequence listing *(specify)*: _____

* *If item 4 applies, some or all of those sheets may be marked "superseded."*

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/IB2002/004162

Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application

☒ claims Nos. 1-13

because:

☐ the said international application, or the said claims Nos. _____
relate to the following subject matter which does not require an international preliminary examination *(specify)*:

☐ the description, claims or drawings *(indicate particular elements below)* or said claims Nos. _____
are so unclear that no meaningful opinion could be formed *(specify)*:

☐ the claims, or said claims Nos. _____ are so inadequately supported by the description that no meaningful opinion could be formed.

☒ no international search report has been established for said claims Nos. 1-13

☐ the nucleotide and/or amino acid sequence listing does not comply with the standard provided for in Annex C of the Administrative Instructions in that:

the written form
- ☐ has not been furnished
- ☐ does not comply with the standard

the computer readable form
- ☐ has not been furnished
- ☐ does not comply with the standard

☐ the tables related to the nucleotide and/or amino acid sequence listing, if in computer readable form only, do not comply with the technical requirements provided for in the Annex C-*bis* of the Administrative Instructions.

☒ See Supplemental Box for further details.

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of: Box III

All of the claims 1-13 (claims 6-11 as referring to any of claims 1-5) comprise design features which were not present in the claims 1-9 that were subject to the search report. As said added design features has not been the subject of a search, no opinion with regard to novelty, inventive step and industrial applicability will be established with regard to claim(s) comprising such a design feature.

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

Neither of claims 2-11 is drafted in accordance with PCT Rule 6.3(b)(ii), since the word "wherein" does not unambiguously define the characterising part of a claim but may as well, as, e.g., in the present claims 1, 12 and 13, be used to further limit or specify the preamble of a claim. Thus, the phrase "wherein" does, per se, i.e., if not followed by the phrase "the improvement comprises" or similar, not define the characterising portion of a claim. In the present case, no obvious reason for not considering it "appropriate" to use any of the examples mentioned in PCT Rule 6.3(b)(ii) for defining the characterising portion of each of claims 2-11 can be seen.

PCT-Application WO PCT/IB02/04162
Applicant / Owner: Nokia Corporation
Title: Sound generating apparatus having enhanced frequency...
Our Ref.: 51154 WO (KG/TP)

Amended Claims

1. Sound generating apparatus comprising:
   - a first cavity (110);
   - a second cavity (120); and
   - an electro-mechanical transducer (100),
     said electro-mechanical transducer (100) exciting sound waves in said first cavity (110) and said second cavity (120);
   - a third cavity (130), wherein said third cavity (130) is connected to said first cavity (110) via at least one first passage (115) of predefined shape, and said third cavity (130) is connected to said second cavity (120) via at least one second passage (125) of predefined shape,
     said third cavity (130) having one or more outlets (150) allowing to radiate sound waves (160) into the exterior;

   wherein said sound generating apparatus provides for acoustical amplification in a low frequency range;
   characterized in that said sound generating apparatus also provides for acoustical amplification in a high frequency range; wherein said high frequency range amplification is in a frequency range between 850 Hz and 7 kHz.

2. Apparatus according to claim 1, wherein said high frequency range amplification serves for acoustical amplification in a frequency range between 950 Hz and 7 kHz.

3. Apparatus according to claim 2, wherein said high frequency range amplification serves for acoustical amplification in a frequency range between 2 kHz and 7 kHz.

4. Apparatus according to any one of the preceding claims, wherein said high frequency range includes at least one acoustic resonance, which serves for acoustic amplification.

5. Apparatus according to any one of the preceding claims, wherein said sound generating apparatus is adapted to a perceptible frequency range of human organs of hearing, which ranges approximately from 20 Hz to 18 kHz.

6. Apparatus according to any one of the preceding claims, wherein said electro-mechanical transducer (100) has a main direction (185) for emitting sound and a supplementary direction (190) for emitting sound, wherein sound waves emitted along said main direction (185) are radiated into said first cavity (110) and sound waves emitted along said supplementary direction (190) are radiated into said second cavity (120).

7. Apparatus according to any one of the preceding claims, wherein said first cavity (110) has a first volume and said second cavity (120) has an essentially bigger second volume.

8. Apparatus according to any one of the preceding claims, wherein said first cavity (110) and said third cavity (130) have substantially an approximately same volume.

9. Apparatus according to any one of the preceding claims, wherein said first cavity (110) and said second cavity (120) are arranged adjacent to each other, wherein said first cavity (110) and said second cavity (120) are spatially separated from each other by said electro-mechanical transducer (100).

10. Apparatus according to any one of the preceding claims, wherein said electro-mechanical transducer (100) is a loudspeaker.

11. Apparatus according to any one of the preceding claims, wherein said apparatus is suitable for being implemented in a portable electric device (200).

12. Mobile electric device comprising a sound generating apparatus comprising:
- a first cavity (110);
- a second cavity (120); and
- an electro-mechanical transducer (100),
  said electro-mechanical transducer (100) exciting sound waves in said first cavity (110) and said second cavity (120);
- a third cavity (130), wherein said third cavity (130) is connected to said first cavity (110) via at least one first passage (115) of predefined shape, and said third cavity (130) is connected to said second cavity (120) via at least one second passage (125) of predefined shape,
  said third cavity (130) having one or more outlets (150) allowing to radiate sound waves (160) into the exterior;

wherein said sound generating apparatus provides for acoustical amplification in a low frequency range;

characterized in that said sound generating apparatus also provides for acoustical amplification in a high frequency range; wherein said high frequency range amplification is located in a frequency range between 850 Hz and 7 kHz.

13. System for generating sound comprising:
- a first cavity (110);
- a second cavity (120); and
- an electro-mechanical transducer (100),
  said electro-mechanical transducer (100) exciting sound waves in said first cavity (110) and said second cavity (120);
- a third cavity (130), wherein said third cavity (130) is connected to said first cavity (110) via at least one first passage (115) of predefined shape, and said third cavity (130) is connected to said second cavity (120) via at least one second passage (125) of predefined shape,
  said third cavity (130) having one or more outlets (150) allowing to radiate sound waves (160) into the exterior;

wherein said sound generating apparatus provides for acoustical amplification in a low frequency range;

characterized in that said sound generating apparatus provides also for acoustical amplification in a high frequency range; wherein said high frequency range amplification is located in a frequency range between 850 Hz and 7 kHz.